

Article

Analysis of GDP revisions in Blue Books, 2019

Revisions to UK National Accounts estimates introduced in Blue Book 2019 including analysis of the quarterly profile of gross domestic product (GDP) in recent years.

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1 . Main points

- This update to the annual revisions article looks at the revisions performance of gross domestic product (GDP) as part of the Blue Book 2019.
- There is a zero-mean revision between the first published estimate of quarterly GDP growth and those published three months later.
- Revisions to GDP growth up to three years after the first published estimate are not statistically significant.
- Internationally, the UK's GDP revisions performance compares favourably with other G7 countries and is broadly similar to that of Germany.

2 . Introduction

It is our role to produce timely estimates of economic activity using all information available at a given point, but there is an inherent trade-off between the timeliness and accuracy of estimates of gross domestic product (GDP). As additional information becomes available, we have a more complete picture of economic activity in that quarter. That is then reflected in the production of our latest estimates.

For example, the first estimate of quarterly GDP is published approximately 40 days after the end of the reference quarter, with further information being released as part of the quarterly national accounts (QNA), which is published approximately 85 days after the end of the reference quarter. The annual Blue Book process enables more comprehensive information to be processed. Additionally, it allows balancing – where information on the output, expenditure and income measures of GDP are reconciled – to take place at a more detailed level, thereby improving the accuracy of those estimates. This GDP data production cycle can take up to three years (because of the time taken before all survey and administrative data sources are available), while the Blue Book tends to be when major methodological improvements are introduced in the UK National Accounts.

This process can lead to revisions to GDP, and we are committed to explaining the reasons for these revisions. It can be difficult to quantify how much of the revision is a result of any one reason in any given period as several explanations will almost certainly apply to each revision of GDP. That said, the main reasons are:

- revising source data and replacing forecasts with outturns
- updating seasonal adjustment factors and output weights
- incorporating annual benchmarks
- undertaking the supply and use table (SUT) compilation process
- introducing new methodological improvements including those to meet new international standards

The Blue Book is an annual publication, which includes the process in which we produce fully reconciled and balanced annual estimates of economic activity. It also offers the opportunity for major methodological improvements to be introduced. Revisions that reflect an increase in data content usually occur only during the first and second Blue Books in which the data are included, with subsequent revisions being almost completely the result of methodological changes.

This article will focus on the revisions that were introduced as part of [Blue Book 2019](#), outlining the main improvements that were introduced and comparing the size of these revisions with previous Blue Books. It will also show the revisions performance over time, providing some insight into the quality of early estimates of GDP. It then concludes with new analysis that looks at revisions to UK GDP compared with those in other countries.

3 . Blue Book 2019

In Blue Book 2019, there was much progress in improving the compilation of gross domestic product (GDP) estimates. The most notable improvements include:

- progress in incorporating a wider set of more appropriate available product deflators for each transaction, confronting these at a detailed level for the first time
- full integration of the institutional sectors into the balancing process of the supply and use tables (SUTs) framework, enabling us to check simultaneously the coherence of current price GDP, volume GDP and the institutional sector accounts in their compilation
- improved estimates of current price GDP through the use of new data sources to give information on the diversification of the services economy and the costs incurred by businesses

There were also other methodological improvements that came into effect in Blue Book 2019, and an overview of some of the more significant ones are included here.

Capital stocks

We have made the most significant changes to the measurement of capital stocks, including incorporating new estimates of the life length of fixed assets, which are now typically shorter in length. In the absence of market prices to value those goods and services that are provided for free, the sum-of-costs approach is used to estimate the value of non-market output. This is where the cost of production is said to equal the value of that output, which includes the cost of using up capital. All else the same, this would have led to higher estimates of consumption of fixed capital and GDP. More information can be found in the [Changes to the capital stock estimation methods for Blue Book 2019](#) article.

Gross fixed capital formation (GFCF)

The main changes impacting estimates of GFCF relate to changes to the improved current price product allocation in the SUTs framework and the consistent application of the best available deflators for those transactions. We have also incorporated improvements to our current price estimates, including those that relate to intangible investment such as intellectual property products, research and development, and artistic originals. A more in-depth explanation of these revisions can be found in the [Impact of Blue Book 2019 changes on GFCF and business investment](#) article.

Changes in inventories

A number of methodological improvements were made to the calculation of change in inventories, which is now calculated on an industry by product basis. This allows for a more accurate estimate to be produced in a SUTs framework. The improved interaction in a SUTs framework has allowed for more coherence checks across the GDP approaches, which are used to provide estimates of intermediate consumption and output by product.

Trade

Improvements in trade estimates primarily reflect enhancements to the Balance of Payments (BoP) adjustments and estimates of UK monetary financial institutions' intragroup fees and cost recharges. There have also been refinements to some of the underlying services trade deflators, to better reflect movements in foreign prices. More information can be found in the [Impact of Blue Book 2019 developments on UK trade data, 1997 to 2016](#) article.

4 . Revisions in Blue Book 2019

There are numerous ways to summarise revisions, including:

- the mean revision (MR), which shows whether there is a systematic tendency for estimates to be revised upwards or downwards from the initial estimates and gives an indication of how reliable the initial estimate is
- the mean absolute revision (MAR), which measures the absolute size of revisions so that upward revisions are not offset by downward revisions of the same magnitude
- the mean square revision (MSR), which incorporates both the degree of bias and the variance of the revision, as large revisions are treated more seriously than small revisions

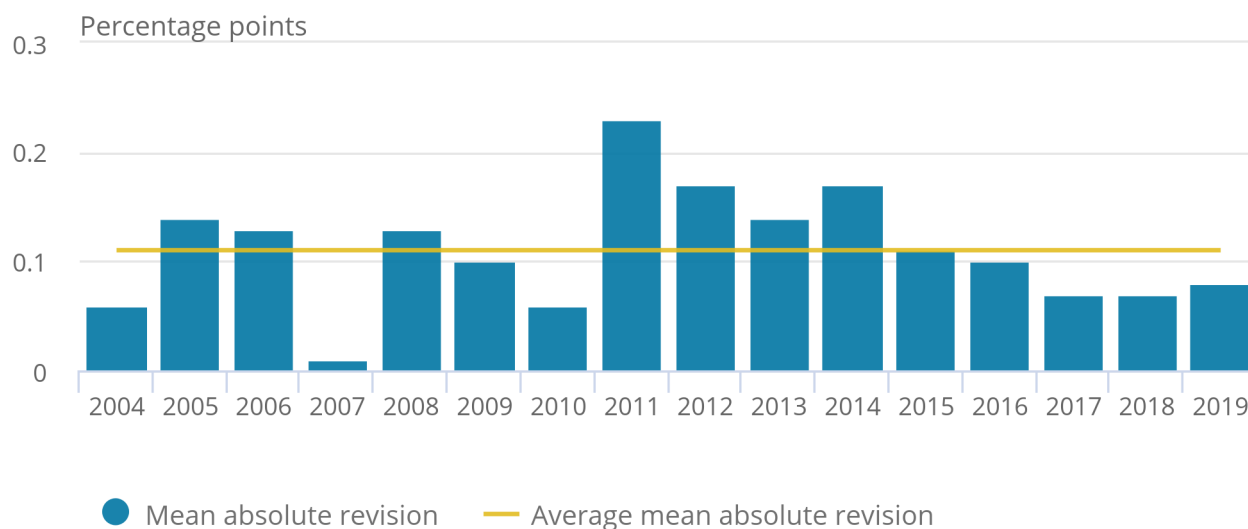
Figure 1 shows the revisions to volume estimates of gross domestic product (GDP), comparing the MAR from Blue Book 2004 through to Blue Book 2019. This illustrates how the size of the most recent set of revisions to quarterly real GDP growth compares with those in previous Blue Books. Revisions to Blue Book 2019 were relatively modest compared with previous Blue Books, with a MAR of 0.08 percentage points compared with an average of 0.11 percentage points across Blue Book 2004 to Blue Book 2018.

Figure 1: Revisions to Blue Book 2019 were relatively modest compared with previous Blue Books

Mean absolute revision of real gross domestic product, UK, 2004 to 2019

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Mean absolute revision of real gross domestic product, UK, 2004 to 2019



Source: Office for National Statistics – UK National Accounts

Notes:

1. The revisions in each Blue Book relate to the period from Quarter 1 1997 to the latest quarter available in that publication.
2. Blue Book 2007 and Blue Book 2010 were largely closed for revision.
3. Blue Book 2011 includes the switch from RPI to CPI, while Blue Book 2014 captures the incorporation of ESA 2010 in the national accounts.
4. The chart is calculated on the revisions between a Blue Book round and the preceding vintage – for example, the 2019 revisions here relate to August and September 2019.

Figure 2 shows selected versions of quarter-on-a-quarter-a-year-ago GDP growth, including the first estimate (T) and the one published five years later (T+60 months). This provides an insight into the scale of GDP revisions that have been reflected in the UK National Accounts, showing how the increased data content and methodological improvements lead to revisions across the five years after the initial estimate is published. The closer the versions are around an observation at any point in time, the smaller the scale of revisions for that quarter. If an estimate has been unrevised from its initial estimate, all of these versions would coincide around the same quarterly GDP figure.

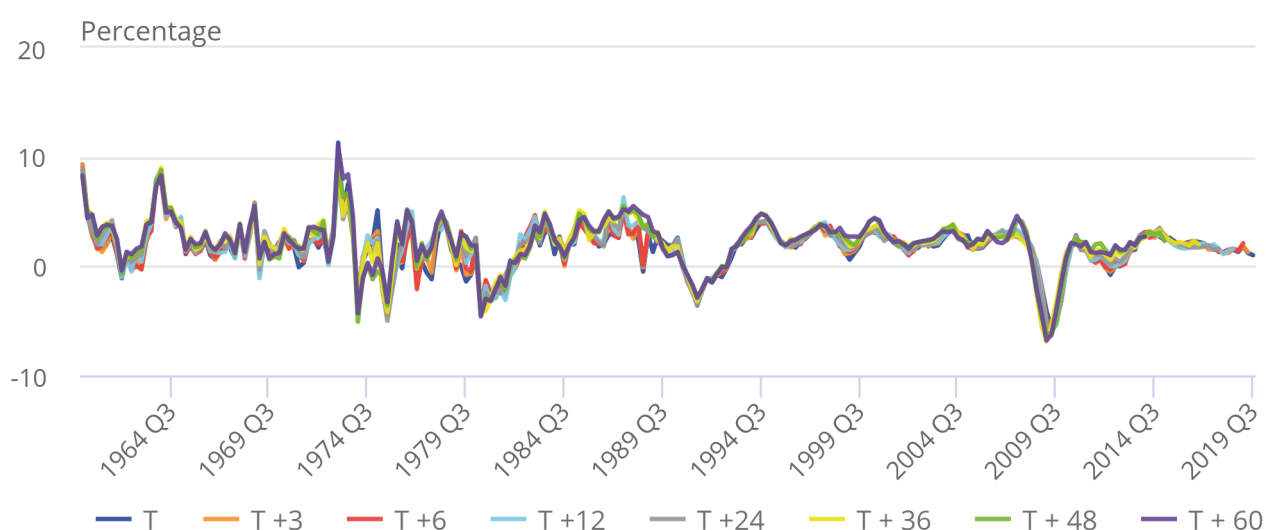
Overall, the last 30 years have been characterised by relatively small revisions. However, there have been some exceptions, such as in the late 1990s and early 2000s as well as the recovery after the financial crisis, where there is a wider range in the quarterly profiles on each of these versions. This includes the first T+60 estimates for the period Quarter 2 (Apr to June) 2013 to Quarter 1 (Jan to Mar) 2014. Compared with the respective first estimates for these quarters, these revisions are relatively modest with a MR of 0.1 percentage points.

Figure 2: The last 30 years have been characterised by relatively small revisions to initial estimates of GDP growth

Versions of quarter-on-same-quarter-a-year ago gross domestic product growth, UK, 1961 to 2019

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Versions of quarter-on-same-quarter-a-year ago gross domestic product growth, UK, 1961 to 2019



Source: Office for National Statistics – UK National Accounts

Notes:

1. Q1 refers to Quarter 1 (Jan to Mar), Q2 refers to Quarter 2 (Apr to June), Q3 refers to Quarter 3 (July to Sept) and Q4 refers to Quarter 4 (Oct to Dec).

Figure 3 shows the MR and MAR between the first published estimate of quarterly GDP growth and those published after 3, 24 and 36 months. There is a zero MR at T+3, implying that on average there is no tendency for the first estimate to be revised up or down in early versions. The MR is a little higher when comparing the first published estimate with later versions. This is because of there being a much larger window during which more information relating to the reference quarter has been gathered.

We find that the initial revisions of the quarterly round (T+3) and those revisions that tend to reflect the incorporation of annual benchmarks and balancing in a supply and use framework (T+24 and T + 36) are not [statistically significant](#). Table 1 shows the MR, MAR and outcome of a two-tailed standard T-test at the 95% [confidence interval](#) to test for statistical significance in the revisions in quarterly GDP growth at T + 3, T + 24 and T + 36. This is not the case for those revisions in the more mature estimates beyond T+36, although these revisions tend to reflect more structural changes to how GDP is compiled in the national accounts. However, since these methodological changes cannot be anticipated at the time of the first estimate, these revisions tend not to be forecastable and are therefore a less accurate reflection of the quality of early estimates.

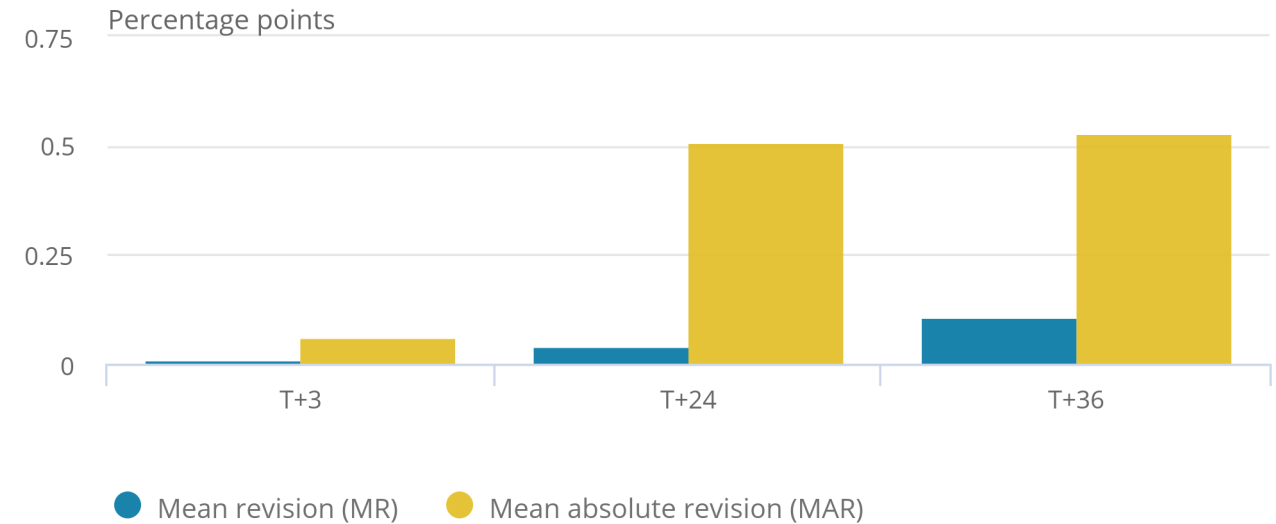
It should be noted that a low MR can be a misleading signal of quality, as it might reflect a high frequency of larger offsetting revisions. The MAR is an alternative indicator in which positive and negative revisions are not able to offset one another. Figure 3 shows that the profile of MAR is very similar, reinforcing the picture that revisions tend to be larger when compared with more mature estimates. The profile shows that it is more likely that there will be a higher number of offsetting revisions in the first two years, relative to the subsequent revisions to the estimate published three years later. This is shown by the MR largely being similar at T+3 and T+24 but there being a more marked increase in the MAR. On the other hand, there is more of a tendency for there to be upward revisions to more mature estimates of GDP. This is likely to corroborate the view that the revisions at this stage are likely to be more structural in nature in that these refer to a change in the concept of economic activity that is being recorded.

Figure 3: Revisions tend to be larger when compared with more mature estimates of GDP growth

Mean revision and mean absolute revision of quarterly gross domestic product growth, UK, 1961 to 2016

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Mean revision and mean absolute revision of quarterly gross domestic product growth, UK, 1961 to 2016



Source: Office for National Statistics – UK National Accounts

Notes:

- 1. This covers the period Quarter 2 1961 to Quarter 4 2016.

Table 1: Revision information and T-Test for statistical significance for quarterly GDP growth

Timespan	T + 3				T + 24				T + 36			
	Mean revision (pp)	Absolute average revision (pp)	T Score ²	Statistically significant	Mean revision (pp)	Absolute average revision (pp)	T Score ²	Statistically significant	Mean revision (pp)	Absolute average revision (pp)	T Score ²	Statistically significant
1961 Q2 to 2016 Q4 ¹	0.01	0.06	1.0661	No	0.04	0.51	0.8823	No	0.11	0.53	1.9571	No
1961 Q2 to 1969 Q4 ¹	n/a	n/a	n/a	n/a	-0.01	0.69	-0.0606	No	0.06	0.79	0.3830	No
1970 Q1 to 1979 Q4 ¹	n/a	n/a	n/a	n/a	0.08	0.91	0.4800	No	0.20	0.98	0.9649	No
1980 Q1 to 1989 Q4	0.03	0.06	1.3791	No	0.09	0.80	0.5539	No	0.18	0.71	1.2704	No
1990 Q1 to 1999 Q4	0.01	0.07	0.4767	No	0.06	0.18	1.7550	No	0.10	0.22	2.5717	Yes
2000 Q1 to 2009 Q4	0.00	0.11	0.0659	No	0.01	0.23	0.1981	No	0.00	0.27	-0.0817	No
2010 Q1 to 2016 Q4	0.02	0.07	1.3457	No	0.01	0.16	0.2444	No	0.07	0.16	1.9558	No

Source: Office for National Statistics – UK National Accounts

Notes

1. Due to the compilation process at the time T + 3 has no revisions pre 1980. [Back to table](#)
2. Two tailed standard significance test at 95% confidence interval. [Back to table](#)

It can be helpful to look at how the revisions profile has changed over time, as this can provide some insight into whether the quality of early estimates of GDP has improved. However, as it might be expected that the size of revisions is correlated with the prevailing macroeconomic conditions, the statistical properties of revisions are likely to reflect cyclical and structural factors.

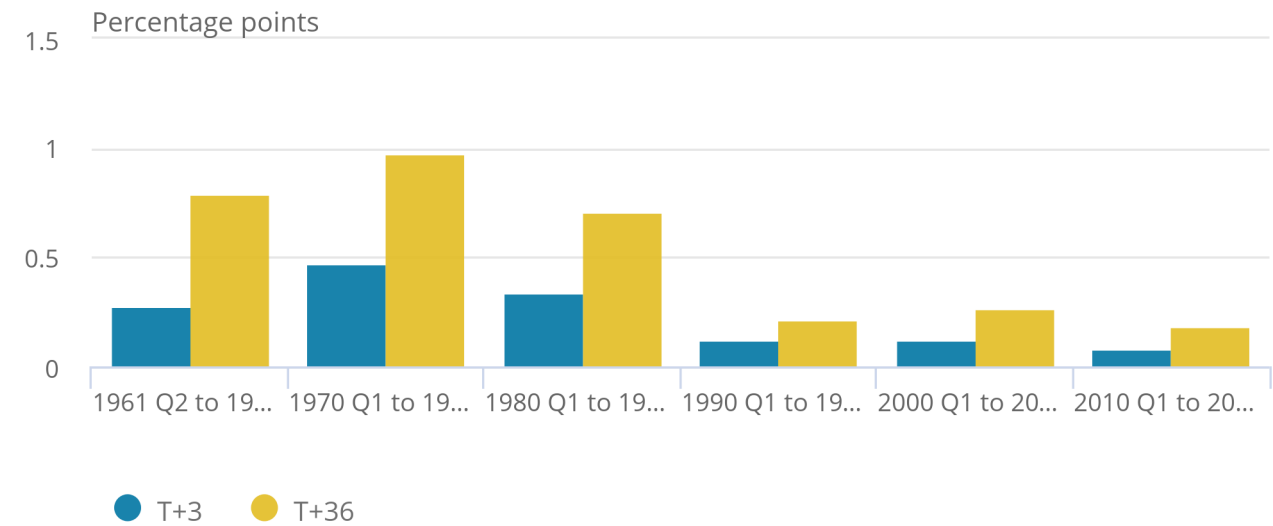
Figure 4 shows the MAR in each of the last six decades, providing some evidence that the quality of early estimates has improved over time, with a lower MAR in the most recent periods compared with those recorded through the 1960s and 1970s. This is likely to reflect to some extent a range of improvements to the measurement of GDP as well as a lower degree of volatility in the UK economy.

Figure 4: The quality of early estimates of GDP growth has improved over time, with a lower mean absolute revision in more recent periods

Mean absolute revision of quarterly gross domestic product growth by subsample, UK, 1961 to 2015

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Mean absolute revision of quarterly gross domestic product growth by subsample, UK, 1961 to 2015



Source: Office for National Statistics – UK National Accounts

Notes:

1. Q1 refers to Quarter 1 (Jan to Mar), Q2 refers to Quarter 2 (Apr to June), Q3 refers to Quarter 3 (July to Sept) and Q4 refers to Quarter 4 (Oct to Dec).

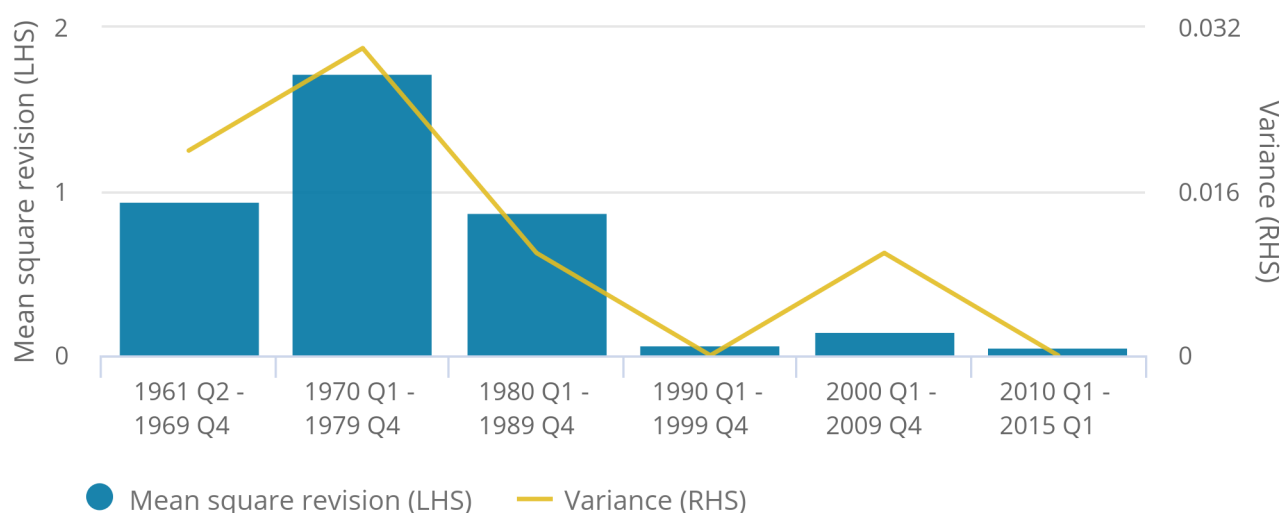
Figure 5 provides some insights into why data revisions have been larger in earlier periods, which were inherently more volatile for the UK economy. The level of inherent uncertainty in such times is much higher, so the scope for data revisions is larger. The variance in the GDP growth estimates can be shown alongside the MSR to indicate how the revision compares with the volatility of GDP movement in that period. The most recent periods have experienced much less volatility, which has also been reflected in there being lower revisions. There have also been improvements in how we record GDP estimates in the UK, which is likely to be another explanation for the lower MSR in these years.

Figure 5: There have been lower revisions to GDP growth in recent periods, likely because of reduced economic volatility and improvements in recording GDP estimates

Mean square revision and variance of quarterly gross domestic product growth, UK, 1961 to 2015

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Mean square revision and variance of quarterly gross domestic product growth, UK, 1961 to 2015



Source: Office for National Statistics – UK National Accounts

Notes:

1. The MSR refers to the revision between the vintages T and T+36, while the variance refers to the vintage T+36.
2. Q1 refers to Quarter 1 (Jan to Mar), Q2 refers to Quarter 2 (Apr to June), Q3 refers to Quarter 3 (July to Sept) and Q4 refers to Quarter 4 (Oct to Dec).

5 . International comparisons

This section looks at a comparison of UK gross domestic product (GDP) revisions performance with that of a selection of other countries. We focus on the other G7 countries – Canada, France, Germany, Italy, Japan and the US – as well as the Netherlands and Australia.

Within the European Statistical System, benchmark revisions – where the whole time series is open to large scale methods revisions – must take place at least once every five years. Some countries, like the UK, make revisions once a year. Other countries, such as the [Netherlands \(PDF, 1.38MB\)](#), store up their revisions and publish them every five years. The inclusion of the Netherlands in our analysis provides a basis for comparison with a country that has a more delayed implementation of revisions than the UK. Countries that fall outside of the European Statistical System face a less rigid revisions structure. These countries are free to revise their estimates when they need to, usually around the implementation of an updated version of the [System of National Accounts \(SNA\)](#) or other major structural change within their accounts. Therefore, we have included Australia in our analysis to provide further comparison points of GDP revisions performance with a country that has a more flexible revisions policy.

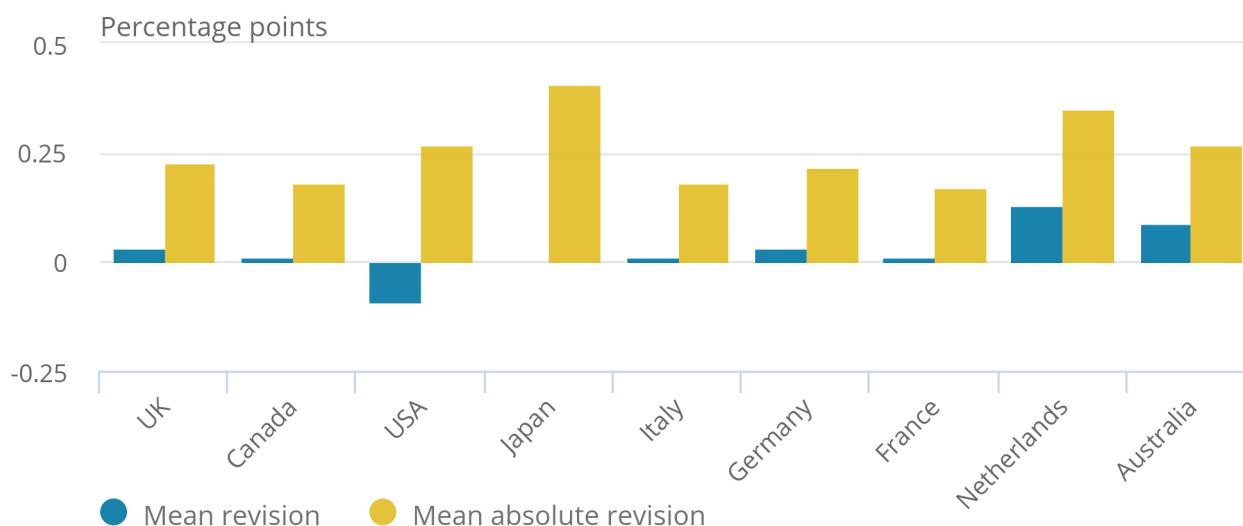
Figure 6 shows the mean revision (MR) and mean absolute revision (MAR) between the first published estimate of quarterly GDP growth and those published three years later for the time period, Quarter 2 (Apr to June) 2002 to Quarter 4 (Oct to Dec) 2016. Most of these selected countries have a positive MR, with the exception of the US and Japan. While Japan recorded a MR of zero, it has the largest MAR of these countries, as its zero MR reflects a higher proportion of positive and negative revisions offsetting one another. This highlights how the MR can be a misleading signal of the quality of early GDP estimates. The UK's revisions performance over the time period is very similar to that of Germany. The Netherlands had the highest MR in the sample and the second highest MAR, after Japan. The relatively high magnitude of both these revision measures could reflect the less frequent revisions updates in the Netherlands.

Figure 6: Most of the selected countries had a positive mean revision over the time period under consideration, with the exception of the US and Japan

Mean revision and mean absolute revision of quarterly gross domestic product growth three years after initial estimates, selection of countries, Quarter 2 (Apr to June) 2002 to Quarter 4 (Oct to Dec) 2016

Figure 6: Most of the selected countries had a positive mean revision over the time period under consideration, with the exception of the US and Japan

Mean revision and mean absolute revision of quarterly gross domestic product growth three years after initial estimates, selection of countries, Quarter 2 (Apr to June) 2002 to Quarter 4 (Oct to Dec) 2016



Source: Organisation for Economic Co-operation and Development – Analysis of GDP revisions in Blue Books

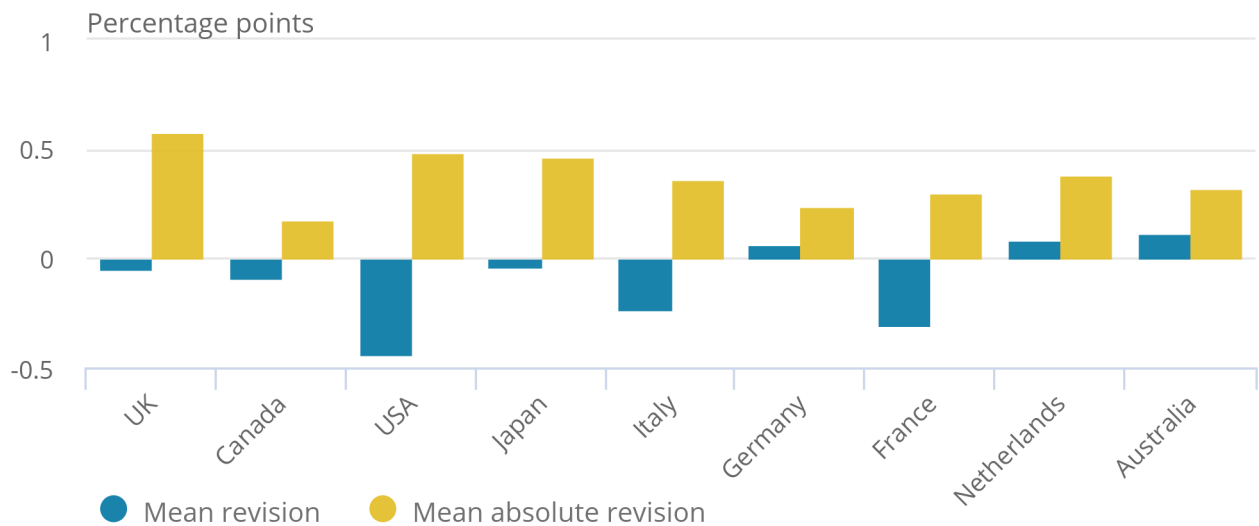
Figure 7 focuses on the period around the financial crisis to see how the revisions performance for these countries compared around this turning point. Analysing the MR and MAR performance of those estimates may provide some insight as to whether the recession had any further impact on the quality of early GDP estimates in the selected countries. Most countries – except for Germany, the Netherlands and Australia – had a negative MR, implying that there was a tendency for initial estimates of GDP growth in these countries to underestimate the true size of the economic downturn during the recession. It is also interesting to note that the UK had the largest MAR during this period, while Canada recorded the lowest MAR.

Figure 7: Most countries had a negative mean revision during the financial crisis; this suggests initial GDP growth estimates tended to underestimate the size of the economic downturn

Mean revision and mean absolute revision of quarterly gross domestic product growth three years after initial estimates, selection of countries, Quarter 1 (Jan to Mar) 2008 to Quarter 4 (Oct to Dec) 2009

Figure 7: Most countries had a negative mean revision during the financial crisis; this suggests initial GDP growth estimates tended to underestimate the size of the economic downturn

Mean revision and mean absolute revision of quarterly gross domestic product growth three years after initial estimates, selection of countries, Quarter 1 (Jan to Mar) 2008 to Quarter 4 (Oct to Dec) 2009



Source: Organisation for Economic Co-operation and Development – Analysis of GDP revisions in Blue Books

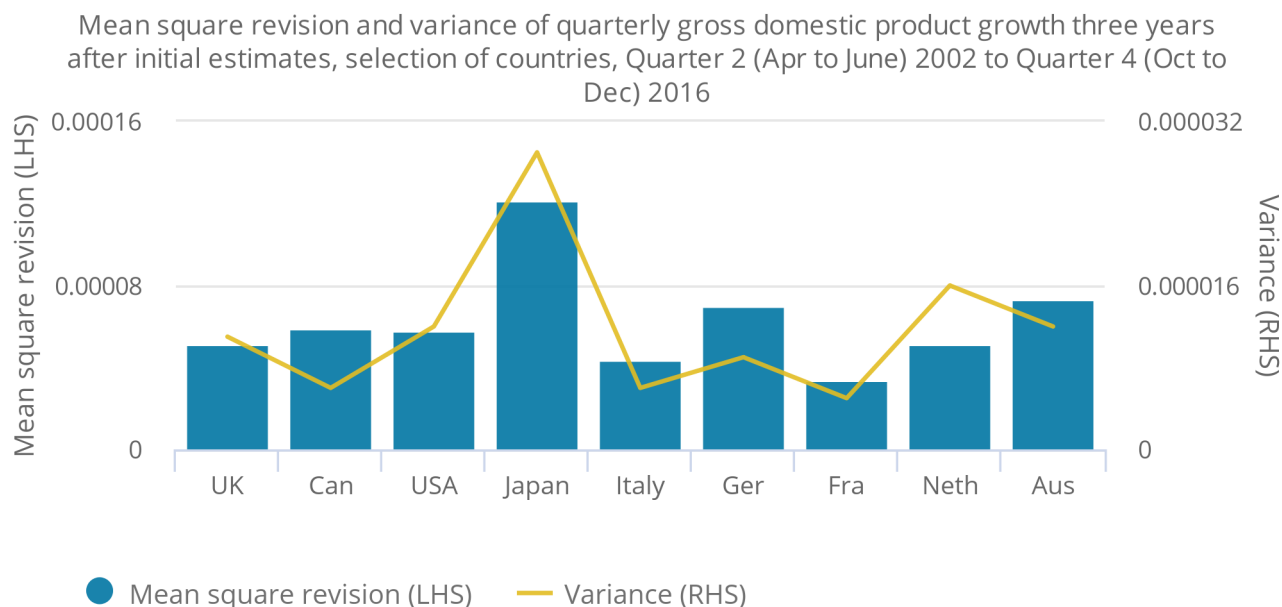
It might be that the size of revisions is correlated with how the economy is performing at the time, reflecting that revisions are more prominent in periods of uncertainty, especially around turning points. Figure 8 compares the mean square revision and the variance between Quarter 2 2002 to Quarter 4 2016.

It is interesting to compare the variance in the UK with other countries of similar MSR. The concurrence of higher volatility and MSR in Japan suggests that higher volatility in the Japanese economy could be an explanation of the larger revisions. On the other hand, the relatively large MSR in Germany is only partially explained by volatility, particularly when compared with Australia, which had a similar MSR but a higher variance. France had both the lowest MSR and variance, followed closely by Italy.

Figure 8: The concurrence of higher volatility and mean squared revision in Japan suggests that higher volatility in the Japanese economy could be an explanation of the larger revisions

Mean square revision and variance of quarterly gross domestic product growth three years after initial estimates, selection of countries, Quarter 2 (Apr to June) 2002 to Quarter 4 (Oct to Dec) 2016

Figure 8: The concurrence of higher volatility and mean squared revision in Japan suggests that higher volatility in the Japanese economy could be an explanation of the larger revisions



Source: Organisation for Economic Co-operation and Development – Analysis of GDP revisions in Blue Books

Notes:

1. The MSR refers to the revision between the vintages T and T+36, while the variance refers to the vintage T+36.
2. Can - Canada
3. Ger - Germany
4. Fra - France
5. Neth - Netherlands
6. Aus - Australia

6 . Conclusions

There is a trade-off between the timeliness and accuracy of estimates of gross domestic product (GDP), which leads to a process of data revisions. This GDP data production cycle can take up to three years, while methodological revisions may take place beyond that. As part of improving the transparency of this process, we publish annual updates that help explain the latest revisions to GDP estimates. The revisions to volume estimates of GDP in Blue Book 2019 were relatively modest compared with those Blue Books published over the previous 15 years.

It is also helpful to look at how revisions to UK GDP estimates compare to those produced by other countries. Revisions are an inevitable feature of producing timely estimates of GDP, so it is a challenge that all national statistical institutes face. While the revisions performance of these selected countries varies, the UK experience is in line with the average performance.

7 . Annex A: Major causes of revisions by Blue Book

Blue Book 2004

Rebalance of 2001 and balanced 2002 for the first time. Reclassified NHS trusts from public corporations sector to central government sector back to 1991. Referenced from 2000 to 2001 and introduced a new method for estimating the output of government health services back to 1996 in chained volume measures (CVMs).

Blue Book 2005

Rebalance of 2002 and balanced 2003, with the reference year moved from 2001 to 2002. Current price revisions back to 1991 for improving the recording of private pension contributions and receipts. For CVM gross domestic product (GDP), there was a new methodology for the estimation of government education and social protection from 1996 onwards. Also improved the allocation of central government consumption to reflect machinery of government changes from 1996 onwards in CVMs.

Blue Book 2006

Full rebalance for 2003 and balanced 2004, with specific current price revisions to earlier years, mainly to apportion adjustments across industries, which was not completed in Blue Book 2005. Reference year moved from 2002 to 2003.

Blue Book 2007

Closed to all revisions except for revisions to estimates for private investment in own-account computer software back to the 1970s, which increased current price levels. No supply and use rebalance of 2004, and no balance of 2005. Reference year unchanged.

Blue Book 2008

Methodological improvements for the output of financial intermediation services indirectly measured (FISIM) made in line with international standards adopted by all EU member states and with worldwide best practice.

Blue Book 2009

Rebalance of 2004 to 2006 and balanced 2007 for first time. Moved from 2003 to 2005 as reference year.

Blue Book 2010

Rebalance of 2006 to 2007 and balanced 2008 for first time. Moved from 2005 to 2006 as reference year.

Blue Book 2011

Introduction of [Standard Industrial Classification 2007 \(SIC 2007\)](#), [Classification of Products by Activity 2008 \(CPA 2008\)](#) and CORD systems and replacing Retail Prices Index (RPI) with Consumer Prices Index (CPI) to deflate the main expenditure and output components (back to 1997 only). Reference year moved from 2006 to 2008.

Blue Book 2012

Insurance revisions to clear gross national income (GNI) reservation taken back to 1987, and deflator changed from RPI to CPI pre-1997 to start of GDP series. Reference year moved from 2008 to 2009.

Blue Book 2013

[European System of Accounts 1995 \(ESA 1995\)](#) GNI reservations for own-account software, improved estimation of artistic originals and imputed rentals of owner occupiers were all addressed back to 1990. The gross capital formation methodological development revised estimates of gross fixed capital formation (GFCF) and changes in inventories back to 1997, and improvements were made to the estimates of bonds data and overseas deposits of private non-financial corporations. Improvements were also made to the alignment of national accounts with the public sector finances. Reference year moved from 2009 to 2010.

Blue Book 2014

ESA 1995 GNI reservations relating to the measurement of the non-profit institutions serving households (NPISH) sector, household expenditure on new cars, the inclusion of illegal activities into the national accounts, and improvements made to the measurement of “own-account construction”. ESA 2010 implementation including research and development, weapons, decommissioning costs, small tools, and pensions. Other changes included the review of public sector finances and further alignment of national accounts with public sector finances, improved methods for inventories and GFCF, Producer Price Index (PPI) and Services Producer Price Index (SPPI) re-basing from 2005 to 2010. Reference year moved from 2010 to 2011.

Blue Book 2015

ESA 1995 GNI reservations for exhaustiveness adjustments for concealed income and under-coverage of unincorporated businesses, new estimates within the NPISH sector and a rebalance across all sectors, cross-border property income, improvements to the estimation of spending on repairs and maintenance of dwellings by householders, improvements to the estimation of the consumption of fixed capital on roads, and a change to the recording of Vehicle Registration Tax as a fee paid on a vehicle when it is first registered. Other improvements related to GFCF, reclassifications, local government pensions, alcohol and tobacco in household final consumption expenditure, narcotics, Consumer Prices Index including owner occupiers' housing costs (CPIH) alignment, and insurance industry measurement. Reference year moved from 2011 to 2012.

Blue Book 2016

Methodological improvements include imputed rental, exhaustiveness adjustments for concealed income, identification of additional components within government final consumption expenditure, estimates for Value Added Tax (VAT) fraud, illegal activities, own-account construction, Transport for London capital stock changes and natural gas imports from Norway. Corrections made to GFCF for improvements to dwellings and to agricultural data. Reference year moved from 2012 to 2013.

Blue Book 2017

Methodological improvements include actual and imputed rental, improvements to recording GFCF, and separation of estimates for the households and NPISH sector. Improving the data sources for dividend income of the self-employed, introducing the new securities dealers survey data and methods, improving the treatment of corporate bonds, shares and dividends methods, and data sources. Other methodological improvements include unfunded public sector pensions methodology review, improvement to illegal activities, revised estimates of exhaustiveness and concealed income adjustment, revised estimates of VAT fraud, BBC data update, and public sector finances alignment. Reference year moved from 2013 to 2015.

Blue Book 2018

Methodological improvements included improved estimates of net spread earnings, purchased software, amendments to how elements of purchased software are recorded, and updated estimates of funded public sector employee pensions in financial corporations.